THE GALL MIDGES OF RAGWEED, AMBROSIA, WITH DESCRIPTIONS OF TWO NEW SPECIES (DIPTERA: CECIDOMYIIDAE)

RAYMOND J. GAGNÉ
Systematic Entomology Laboratory, IIBIII, Agr. Res. Serv., USDA[1]

ABSTRACT—Four species of Cecidomyiidae, all from North America, occur on ragweed, *Ambrosia* spp.: *Asphondylia* ambrosiae Gagné, new species, *Contarinia partheniicola* (Cockerell), *Rhopalomyia* ambrosiae Gagné, new species, and *Neolasioptera ambrosiae* Felt. The first 3 species form bud galls; the last lives in the stems. The poorly known *C. partheniicola* is redescribed on the basis of new specimens.

It will be small comfort to hayfever sufferers in North America to know that four species of Cecidomyiidae feed on ragweed and indirectly reduce pollen production. The work of these species is ineffective, in large part, presumably, because parasites reduce gall midge populations considerably. But in Europe and Asia, where *Ambrosia artemisiifolia* L. has become naturalized, these midges, minus their parasites, can be regarded as possible biological controls. The gallforming cecidomyiids, in general, are assumed to be good risks for introduction because of evidence or, in some cases, belief that they are closely host specific. Dr. O. V. Kovalev of the All-Union Plant Protection Institute in Leningrad intends to test for host specificity the Nearctic species of gall midges treated below. If the species prove specific enough, they presumably will be introduced into Russia.

Two of the four cecidomyiids from *Ambrosia*, the *Asphondylia* and the *Rhopalomyia*, are new to science. Another species, *Contarinia partheniicola* (Cockerell) is poorly known and so odd compared with its congeners that I have redescribed it.

I am describing the two new species only because of their immediate importance in biological control work. Ideally, descriptions of new species in such large genera as *Asphondylia* and *Rhopalomyia* should await a thorough generic revision. Even though I have reviewed (unpub.) the Nearctic species of *Asphondylia* and *Rhopalomyia*, the immature stages of many species are still unknown, and because of this, I am unable to distinguish satisfactorily among many species known only from adults or from one sex. The probable result of the existence of many indistinguishable "species" is that one will be led to conclusions that are not necessarily correct concerning host specificity.

[1] Mail address: c/o U.S. National Museum, Washington, D.C. 20560.

I am grateful to the following persons for contributing specimens and information used in this paper: S. W. Frost, State College, Pa.; R. D. Goeden and D. W. Ricker, Univ. of Calif., Riverside; and C. E. Stegmaier, Jr., Hialeah, Fla.

Asphondylia ambrosiae Gagné, new species

Adult: Wing length: ♂, 2.7–2.9 mm; ♀, 3.2–3.4 mm. Palpus of 3 cylindrical segments of uniform diameter; segment I slightly longer than wide, II about 2× as long as I, III about 3× as long as long as I. Tarsal claws as in fig. 14. Distal half of ovipositor (needle-shaped portion) 1.7–2.1 as long as sternum VII.

Pupa: Antennal horns and frontal crests as in fig. 15, 16.

Larva: Spatula as in fig. 13. A pair of terminal papillae apparent on each side of anus.

Holotype: Pupal exuvium, Miami, Fla., XI-4-1971, C. E. Stegmaier, Jr., USNM Type No. 72836. A pupal exuvium was chosen as holotype because pupal characters are the most diagnostic in *Asphondylia*; there was no adult specimen associated with the holotype exuvium. Paratypes (all in USNM): ♂ ♂, ♀ ♀, pupal exuvia, and larvae, ex galls on *Ambrosia artemisiifolia*, Hialeah, Fla. (C. E. Stegmaier, Jr.) and ex *Ambrosia monophylla* (Walt.) Rydb., Lake Placid, Fla. (S. W. Frost), and ♂ ♂, ♀ ♀, and pupal exuvia from *Ambrosia dumosa* (Gray) Payne, San Diego Co., Calif. (R. D. Goeden and D. W. Ricker).

A. ambrosiae forms fuzzy, globose bud galls on *Ambrosia* spp. Pupation takes place within the galls.

The pupae and larvae are similar to those of *Asphondylia helianthiglobulus* Osten Sacken. The only difference I can find between these two species is the length of the ovipositor with respect to that of sternum VII. The ovipositor of *helianthiglobulus* is somewhat longer than that of *ambrosiae* at 2.6–2.8 times the length of sternum VII. Comparison of *ambrosiae* with *Asphondylia xanthii* Felt, reared in Texas from *Xanthium*, a plant with a close affinity to *Ambrosia*, is not possible: the ovipositor of the lone female type of *xanthii* is broken off, and the immature stages are unknown.

Contarinia partheniicola (Cockerell)

Diplosis partheniicola Cockerell, 1900:201.

Male: Wing length, 2.3–2.6 mm. Postvertical peak absent. Eye facets hexagonoid ventrolaterally, rounded elsewhere, not appreciably farther apart laterally than dorsally. Antennal flagellomere III (fig. 8): loops of circumfila short, the bases not evenly aligned on a horizontal plane; internode and neck shorter than preceding nodes. Frontoclypeus with 9–18 setae. Palpus short, one-segmented. Anepisternum with 7–12 setae. Claws and empodia of equal length. Abdominal terga without scales and with few lateral setae: terga I–V (all setal counts made on one-half of terga) with 0–4 lateral setae; VI with 11–14 caudal setae, 3–7 laterals; VII with 9–18 caudals and 7–12 laterals; caudal setal rows unbroken

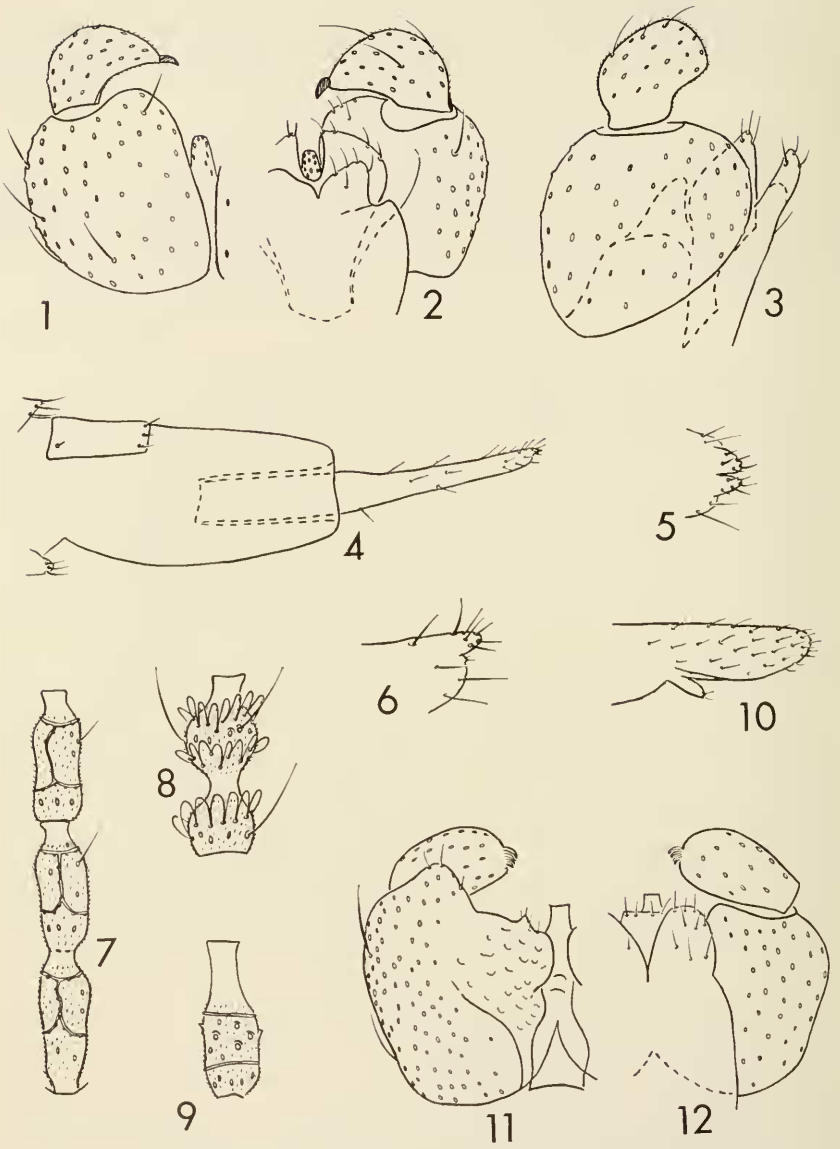

Fig. 1–8. *Contarinia partheniicola*. 1, ♂ genitalia (ventral view). 2, same (dorsal). 3, same (lateral). 4, ♀ postabdomen (lateral). 5, ♀ cerci (dorsal). 6, same (lateral). 7, ♀ flagellomeres I–III. 8, ♂ flagellomere III. Fig. 9–12. *Rhopalomyia ambrosiae*. 9, ♂ flagellomere III. 10, ♀ cerci (lateral). 11, ♂ genitalia (ventral). 12, same (dorsal).

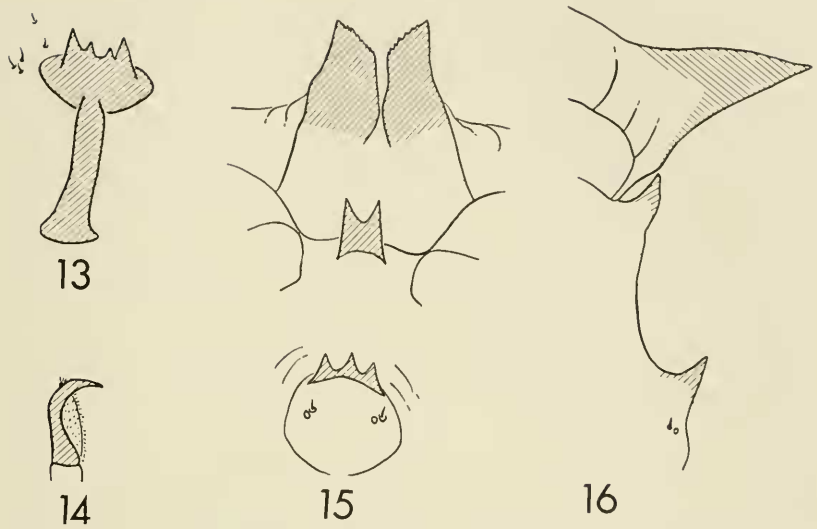

Fig. 13–16. *Asphondylia ambrosiae*. 13, larval spatula. 14, adult tarsal claw. 15, pupal cephalic armature (ventral). 16, same (lateral).

or with slight interruption mesally. Genitalia (fig. 1–3): cerci triangular; lobes of sternum X short, wide, obtuse apically; aedeagus short, wide, punctate; basimere very stout; telomere setulose throughout, very wide basally, tapering to apical tooth.

Female: Wing length, 1.7–1.9 mm. Antennal flagellomeres I–III (fig. 7) with proportions about as 1.00:0.86:0.81 (average of 4 spns.). Other cephalic and thoracic characters as in male. Abdominal terga without scales and with few lateral setae (all setal counts made on one-half of terga): terga I–V with 2–4 lateral setae and a single complete row of caudal setae; VI with 0–10 laterals and 15–17 caudals mainly in single row; VII with 2–8 laterals and 15–16 caudals in double row; VIII with 1–4 short caudals. Tergum VII (measured from basal trichoid sensillae to caudal edge) about 0.4 length distal half of ovipositor (fig. 4); cerci (fig. 5, 6) short, about as wide as long, broadly rounded apically.

Larva and pupa unknown.

Lectotype, here designated, male, emerged III-26-1900, ex galls on *Parthenium incanum* H.B.K., near foot of Picacho Mt., Mesilla Valley, N. Mex., in Felt Collection [sent to Felt by Cockerell] on indefinite loan to Systematic Entomology Laboratory, U.S.D.A., from New York State Museum in Albany. Paralectotypes: 3 ♂ ♂, same data as lectotype, in Felt Collection; pupa[e], larva[e], gall[s] either not saved or lost. Additional adults (all on *Ambrosia* in California collected by R. D. Goeden and D. W. Ricker): ex galls on *Ambrosia chamissonis* (Less.) Payne, II-12-1970, San Clemente, Orange Co.; *A. confertiflora* D.C., XI-9-1970, Otay, San Diego Co.; *A. dumosa*

(Gray) Payne, III-4 to 8-1971, Desert Center, Riverside Co.; *A. eriocentra* (Gray) Payne, Cedar Canyon, San Bernardino Co.; *A. psilostachya* DC, I-28-1970, Alpine, San Diego Co., and I-28-1969, Oceanside, San Diego Co.

Contarinia partheniicola forms whitish, woolly, cupulate galls 5–8 mm long and 4–5 mm wide. Previously reported only from *Parthenium incanum*, the type host, it is now known to occur on *Ambrosia* spp. *Parthenium* and *Ambrosia* are closely related genera. R. D. Goeden writes (pers. comm.) that the galls on *Ambrosia* are formed singly or in small groups on various parts of the shoots, e.g., on axillary buds along the stems, on the young leaves, on the staminate florets, and along the rachis of the inflorescence.

This unusual species nearly bridges the gap between *Contarinia* and *Halodiplosis*; the latter now seems only an offshoot of *Contarinia* stock that is adapted to the Chenopodiaceae. As species of *Contarinia* become better known, they only broaden the generic definition. Although *C. partheniicola* resembles *Halodiplosis* in the foreshortened, broad, male genitalia and female cerci, the one-segmented palpus, and the tricircumfilar male flagellomeres, the two taxa are not necessarily monophyletic. The last two characters occur elsewhere in *Contarinia*, and the first two may be merely adaptive. The larva of neither taxon is known but might clarify the matter. In my key (Gagné, 1973) *C. partheniicola* will run to *Halodiplosis*, but, unlike *Halodiplosis*, *C. partheniicola* has only a few scattered setae on the distal half of the ovipositor, the empodia and tarsal claws are of equal length, and the telomere of the male genitalia is widest basally, and its tooth is very narrow.

Neolasioptera ambrosiae Felt

Neolasioptera ambrosiae Felt, 1909:288.

This species was originally and subsequently reared from stems of *Ambrosia trifida* L. in New York. In addition I have found it in Maryland in stems of *A. artemisiifolia* L. *N. ambrosiae* is hard to find because there is usually no apparent gall or only the slightest swelling; occasionally, it causes a noticeable fusiform swelling on the small side branchlets. One to several larvae occur in a stem where they crawl up and down silken tubes where the pith would normally be. Before pupation, the larva cuts a hole almost all the way through the twig and retracts into the pith, where it overwinters. In spring the larva pupates, and the adult emerges a short time later.

Rhopalomyia ambrosiae Gagné, new species

Adult: Wing length: ♂, 1.8–1.9 mm; ♀, 1.7–1.9 mm. Male antenna broken; flagellomere III as in fig. 9. Female antenna with 18–19 flagellomeres; flagel-

lomere III without definite neck, gradually tapering from end of node to apex. Eyes broadly joined at vertex. Palpus 1-segmented, the apex blunt or pointed. Claws simple, slightly shorter than empodia. Terga with lateral setae; caudal setal rows not interrupted mesally. Male genitalia as in fig. 11–12. Ovipositor elongate, the fused cerci as in fig. 10.

Pupa: Antennal horns not produced, the ventrocephalic corner barely acute. Frons without projections.

Larva: Unknown.

Holotype, male, ex terminal galls on *Ambrosia artemisiifolia*, VI-7-1966, Hialeah, Fla., C. E. Stegmaier, Jr., USNM type number 72837. Paratypes, 6 ♂ ♂, 4 ♀ ♀, pupa, same data as for holotype.

C. E. Stegmaier, Jr., writes (pers. comm.) that *R. ambrosiae* forms a bud gall on the terminal tips of *A. artemisiifolia*. In my manuscript key to *Rhopalomyia*, *R. ambrosiae* runs closest to *R. bulbula* (Felt), a species that forms galls on the crowns of goldenrod (*Solidago*). The male genitalia of the two species are similar except that those of *bulbula* appear more robust. Comparison of abdominal sclerites of the two species is not possible because all the specimens I have of *ambrosiae* were killed too soon after eclosion. Also, the pupa of *bulbula* is unknown. There are so many different species of *Rhopalomyia* on goldenrod, each species making a different kind of gall, that I think it is safe to consider *R. ambrosiae*, found on a different host and forming a distinct gall from *R. bulbula*, a separate species.

References

Cockerell, T. D. A. 1900. *Diplosis partheniicola*, n. sp. Entomologist. 33:201.

Felt, E. P. 1909. Additional rearings in Cecidomyiidae. J. Econ. Entomol. 2:286–293.

Gagné, R. J. 1973. A generic synopsis of the Nearctic Cecidomyiidi (Diptera : Cecidomyiidae : Cecidomyiinae). Ann. Entomol. Soc. Amer. 66:857:889.